

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Claims 1-13 (Canceled).

Claim 14 (Currently amended) A process of fabricating a planar optical device, the process comprising:

forming a plurality of ridge ~~structure~~ structures in a lower cladding layer of a first material, wherein:

the lower cladding layer has a first refractive index; and
each of the plurality of ridge structures having a ridge portion has a top surface and sidewalls, a sidewall portion, and a planar portion in a layer of a first material, said layer having a first refractive index;

simultaneously depositing and etching a core layer over the plurality of ridge ~~structure~~ structures to form an intermediate structure, the core layer comprising a core material having a second refractive index greater than the first refractive index,

wherein the core layer completely and continuously covers [[the]] an entire surface of the ~~ridge portion~~ top surface, an entire surface of the ~~sidewall portion~~ sidewalls, and an entire surface of the ~~planar portion of the ridge structure~~ horizontal surfaces between each of the plurality of ridge structures; and

depositing an upper cladding layer over the intermediate structure, the upper cladding layer comprising an upper cladding material having a third refractive index less than the second refractive index.

Claim 15 (Currently amended) The process of Claim 14 wherein depositing the core layer comprises:

depositing the core layer by a physical vapor deposition process wherein at least one of the plurality of ridge ~~structure~~ structures is positioned opposite a target comprising the core material and a first radio frequency power is applied to the target at a first frequency in the presence of a gas such that a uniform plasma condition is created in the vicinity of the target[~~[,]~~]; and sputtering material from the target onto at least one of the plurality of ridge ~~structure~~ structures.

Claim 16 (Currently amended) The process of Claim 15 wherein depositing the core layer further comprises

applying a second radio frequency power to at least one of the plurality of ridge ~~structure~~ structures.

Claim 17 (Currently amended) The process of Claim 15 wherein depositing the core layer further comprises

applying a third radio frequency power ~~at a second frequency~~ to the target, wherein the third radio frequency power is applied at second frequency which is smaller than the first frequency.

Claim 18 (Currently amended) A process of fabricating a planar optical device, the process comprising:

forming a plurality of ridge ~~structure~~ structures in a lower cladding layer of a first material, wherein:
the lower cladding layer has a first refractive index; and
each of the plurality of ridge structures having a ridge portion has a top surface and sidewalls; a sidewall portion, and a planar portion in a layer of a first material, said layer having a first refractive index;

simultaneously depositing and etching a core layer over the plurality of ridge structure structures to form an intermediate structure, the core layer comprising a core material having a second refractive index greater than the first refractive index,

wherein the core layer completely and continuously covers [[the]]
an entire surface of the ridge portion top surface, an entire surface of the sidewall portion sidewalls, and an entire surface of the planar portion of the ridge structure horizontal surfaces between each of the plurality of ridge structures;

depositing an upper cladding layer over the intermediate structure, the upper cladding layer comprising an upper cladding material having a third refractive index less than the second refractive index;

wherein depositing the core layer comprises depositing the core layer by a physical vapor deposition process, wherein at least one of the plurality of ridge structure structures is positioned opposite a central region of a target, wherein the target comprises the central region and outer regions, the central region comprising the core material and the outer regions comprising material of lower refractive index than the core material, and wherein a first radio frequency power is applied to the target in the presence of a gas such that a uniform plasma condition is created in the vicinity of the target[[,.]] and sputtering material from the target onto at least one of the plurality of ridge structure structures.

Claim 19 (Currently amended) The process of Claim 18 wherein depositing the core layer further comprises

applying a second radio frequency power to at least one of the plurality of ridge structure structures.

Claim 20 (Currently amended) The process of Claim 18 wherein ~~the ridge structure comprises a ridge portion and a planar portion~~ and the core layer comprises a core portion disposed overlying the ~~ridge portion~~ top surface, a slab portion overlying ~~the planar portion~~ horizontal surface, and a sidewall portion disposed on a ~~sidewall of the ridge portion~~ the sidewalls, and wherein the sidewall portion comprises material of the outer regions of the target.

Claim 21 (Withdrawn) The process of Claim 14 wherein depositing the core layer is depositing the core layer by a physical vapor deposition process wherein the ridge structure is positioned opposite a target composed of a target material and pulsed direct current power is applied to the target in the presence of a background gas and a reactive gas, wherein reaction between the target material and the reactive gas results in deposition of the core material onto the ridge structure.

Claim 22 (Withdrawn) The process of Claim 21 wherein the target material comprises aluminum and the reactive gas comprises oxygen.

Claim 23 (Withdrawn) The process of Claim 22 wherein the target material further comprises a chemical species selected from the group consisting of silicon, rare earth elements, transition metal elements, and combinations thereof.

Claim 24 (Currently amended) The process of Claim 14 wherein depositing the upper cladding layer comprises

depositing the upper cladding layer by a physical vapor deposition process wherein the intermediate structure is positioned opposite a cladding target composed of the upper cladding material and a second radio frequency power is applied to the cladding target in the presence of a gas such that a uniform plasma condition is created in the vicinity of the target, sputtering material from the cladding target onto the intermediate structure.

Claim 25 (Currently amended) The process of Claim 24 wherein depositing the upper cladding layer further comprises

applying a third radio frequency power to the intermediate structure.

Claim 26 (Original) The process of Claim 14 wherein the layer of core material has an average surface roughness of less than about 3 nanometers.

Claim 27 (Previously presented) The process of Claim 14 wherein forming the ridge structure in the layer of the first material comprises:

etching at least one of the plurality of ~~ridge structure~~ structures in a silicon wafer;
and
exposing the etched silicon wafer to an oxidizing atmosphere under conditions wherein a portion of silicon of the silicon wafer undergoes a reaction to convert at least the ridge structure to a silica ridge structure, thereby forming the layer of a first material on the silicon wafer.

Claim 28 (Withdrawn) The process of Claim 14 wherein depositing the core layer over the ridge structure comprises:

depositing a layer of a core host material over the ridge structure;
implanting ions of chemical species selected from the group consisting of rare earth ions, transition metal ions, and combinations thereof into the core host material to form core material.

Claim 29 (Previously presented) A method of fabricating a planar optical device, the method comprising:

forming a plurality of ~~ridge structure~~ structures in a layer of cladding material,
wherein:
each of the plurality of ridge structures having a ridge portion has a
top surface and sidewalls, a sidewall portion, and a planar
portion in a layer of a first cladding material;
forming an intermediate structure by simultaneously depositing and etching core material overlying the plurality of ~~ridge structure~~ structures by a physical vapor deposition process in which, in the presence of a background gas, a first radio frequency power is applied to a sputtering target comprising the

core material and a second radio frequency power is applied to at least one of the plurality of ridge structure structures

wherein the core layer completely and continuously covers [[the]]

an entire surface of the ridge portion top surface, an entire

surface of the sidewall portion sidewalls, and an entire

surface of the planar portion of the ridge structure

horizontal surfaces formed between each ridge structure of

the plurality of ridge structures; and

depositing an upper cladding layer over the intermediate structure, the upper

cladding layer comprising a second cladding material, wherein

the refractive index of the core material is greater than the

refractive index of the first cladding material and of the

second cladding material.